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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,199	06/27/2001	Nelson T. Rotto	10277US01	3864

7590 09/26/2005

Attention: Amelia A. Buharin
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EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 09/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/893,199	ROTT, NELSON T.	
	Examiner	Art Unit	
	Martin J. Angebrannt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/15/05.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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1. The response filed by the applicant has been read and given careful consideration.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3 Claims 26-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar et al.

EP 0945762, in view of Ueda JP 05-323850 and Chang '478 combined with (Keys et al. '152 and/or JP 06-282209) and Sommerfield et al. '998.

Dhar et al. EP 0945762 describes the formation of thick holographic recording media using two independent polymerization reactions which are compatible. The compatibility prevents phase separation. The first polymerization forms a polymeric matrix with the photosensitive monomeric material dispersed throughout the polymeric matrix. [0009-0010]. The resulting matrix containing the monomeric material should be flexible [0013]. The formation of holograms, waveguides or the like is disclosed. [0015]. Various polymerization reactions, including forming isocyanate-hydroxyl step polymerization (urethane formation) may be used to form the polymeric matrix [0017]. Useful monomers are disclosed together with refractive index concerns. [0019]. Urethanes are compatible with monomers and react independently from the most monomers. [0026-0033 and 0041]. The use of substrates on both sides of the medium with spacers to control the thickness is disclosed. [0034]. Example 1 uses 0.2519 g (68.54 wt%) of diisocyanate-terminated polypropylene glycol, 0.047 g (12.8 wt%) of dihydroxypolypropylene glycol, 0.0678 g (18.45 wt%) of 4-chlorophenyl acrylate

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(0.051+0.0168), 0.00063 g (0.17 wt%) CGI 784 and 0.0002 g (0.05 wt%) dibutyltin dilaurate.

[0041]. The use of page reading techniques is disclosed with respect to Psaltis et al. [0003].

Ueda JP 05-323850 discloses the use of various isocyanates, such as 1,6-hexamethylene diisocyanate, in forming a crosslinked crosslinked matrix. [0047]. Disclosed monomers, include acrylates, such as tribromophenyl acrylate and tetrabromophenyl acrylate. [0011-0019].

Chang '478 teaches that it is well known in the art that primary aliphatic isocyanates, such as 1,6-hexamethylene diisocyanate, react significantly faster than secondary or tertiary isocyanates. (1/24-31).

Keys et al. '152 disclose photopolymerizable holographic recording media, which use liquid monomers including halogenated aromatic acrylate monomers (5/10-26). These include preferred monomers, such as pentachlorophenyl acrylate and 2,4,6-tribromophenyl acrylate. (5/33-44).

JP 06-282209 teaches the use of monomers, such as pentabromophenyl acrylate, which have a high refractive index [0014].

Sommerfield et al. '998 teach the use of trimers of hexamethylene diisocyanates to form polymeric networks/matrices, which include monomeric materials. (21/35-45). The use of this in holographic systems is disclosed. (15/18-32). Monomeric materials are disclosed in columns 16 and 17.

It would have been obvious to one skilled in the art to modify the invention of example 1 of Dhar et al. EP 0945762 by using other polyisocyanates, such as 1,6-hexamethylene diisocyanate, in forming a crosslinked crosslinked matrix based upon the disclosure of Ueda JP 05-323850 that the use of this polyisocyanate is known to be useful in the holographic arts and

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the teachings of Chang '478 that the cure rate of this polymer is much quicker than secondary or tertiary isocyanates which results in a time savings in preparation of the medium for recording holograms and to use monomers known to be useful in holographic recording, particularly those having a high refractive index and contributing to compatibility, such as the halogenated acrylates, tribromophenyl acrylate or pentabromophenyl acrylate disclosed by Keys et al. '152 and/or JP 06-282209, in place of the 4-chlorophenyl acrylate in the combination of Dhar et al. EP 0945762, in view of Ueda JP 05-323850 and Chang '478, based upon the compatibility taught in Dhar et al. EP 0945762 at [0039-0041] and desirability of high refractive index monomers taught in Dhar et al. EP 0945762 at [0019] and further it would have been obvious to one skilled in the art to modify the invention of Dhar et al. EP 0945762, combined with Ueda JP 05-323850 and Chang '478 together with (Keys et al. '152 and/or JP 06-282209) by using the trimers of hexamethylene diisocyanates disclosed by Sommerfield et al. '998 rather than diisocyanate-terminated polypropylene glycol as these are primary isocyanates and would be expected to react faster than secondary or tertiary isocyanates and based upon their previous disclosed usefulness in holographic recording compositions.

The deficiencies of the references in paragraphs 4 and 5 of the previous office action are overcome by the addition of the further references recited above. A desire for increase speed and hence productivity is always of concern to one of ordinary skill in the art and to imply that it is not would remove much of the motivation for inventions around the world. Particularly with respect to holographic articles and those using light to cure, speed is essential as the longer the exposure the more chance, a vibration or similar source of error will reduce the clarity of the holographic image. The applicant points out the use of specific catalysts in the prior art and

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states that these are not required in the instant claims. The examiner points out that these catalysts are certainly not excluded by the claims and notes that the identified catalyst is specifically disclosed on page 14 of the specification. Therefore this argument fails. The arguments that Ueda fails to teach the utility of various isocyanates, such as 1,6-hexamethylene diisocyanate, in forming a crosslinked crosslinked matrix neglects the teachings in section [0046-0047 and 0083] of that reference. The latter citation uses a catalyst cured matrix in the example. Therefor, the use of various isocyanates, such as 1,6-hexamethylene diisocyanate, in forming a crosslinked crosslinked matrix is already known in the art. *Further, the advantages of primary aliphatic isocyanates is clearly set forth in Chang '478, this is the same advantage described on page 11 of the instant specification.* The use of trimers is also known within the holographic arts as evidenced by Sommerfield et al. '998 and specifically describes the use of these networks with free radically polymerizable acrylate systems.

In response of the arguments of the applicant in the amendment of 07/15/05, the examiner notes that the photosensitive articles recites the cured polyurethane matrix, “a polyurethane matrix comprising the reaction product of “ not the precursors and so the curing rate of that reaction is immaterial to the photosensitive articles claims and the process of use claimed. What is more important in addressing issues of unobviousness are the artifacts which result from the curing using that monomer and the applicant is directed to the no yellowing disclosed by Sugiyama et al. '086, Mizuno et al. '147 and Sato et al. '846, which is congruent with the durability discussed in Dhar et al. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413,

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208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The motivation to use the dimers and trimers of hexamethylene diisocyanate based upon the rate of cure. The applicant misinterprets Ueda, et al. , which prefers blocked isocyanates, not aromatic or secondary isocyanates as alleged. Further, the direction to use primary isocyanates flows from Chang et al., who specifically refers to primary isocyanates and specifically recites hexamethylene diisocyanate. With respect to the weatherability, the examiner directs the applicant to the other properties including no yellowing disclosed by Sugiyama et al. '086, Mizuno et al. '147 and Sato et al. '846, which is congruent with the durability discussed in Dhar et al.. The JP 06-282209 reference is used to establish the refractive index of the monomer and so the issue fo the matrix is irrelevant. Furthermore the Keys et al. '152 reference also discusses them and establishes their use in holographic recording media. The examiner did not state that Sommerfield et al. '998 taught the polyurethane matrix formation, but is relied upon the establish compatability with free radically curable systems, which is congruent with the consideration/ teachings of Dhar et al. **If the applicant has data that the holographic recording media including the inventive cured polyurethane matrix is unobviously different from that resulting from the use of other primary isocyanates, this should be made of record to obviate the rejection. The examiner notes that low/no discoloration and safeness in handling these are known in the art as evidenced by Sugiyama et al. '086 and Mizuno et al. '147 and Sato et al. '846 teaches this as being important in holography.**

4 Claims 26-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar et al. EP 0945762, in view of Ueda JP 05-323850 and Chang '478 combined with (Keys et al. '152

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and/or JP 06-282209) and Sommerfield et al. '998, further in view of (Sugiyama et al. '086 or Mizuno et al. '147) combined with Sato et al. '846.

Sugiyama et al. '086 teach that 1,6-hexamethylene diisocyanate, dimers and trimers of this compound have advantages in safeness of handling, and no discoloration. (13/36-52).

Mizuno et al. '147 teach that 1,6-hexamethylene diisocyanate, dimers and trimers of this compound have advantages in safeness of handling, and no yellowing. (4/29-39).

Sato et al. '846 teach that yellowing of the polymeric hologram film in response to light is undesirable (10/6-12, tables 4,5,7, 8 [sic, 9].)

In addition to the basis provided above, the examiner cites the teachings of Sugiyama et al. '086 or Mizuno et al. '147 which specifically describe the benefits of using 1,6-hexamethylene diisocyanate, dimers and trimers of this compound in terms of low volatile emissions, safety and no discoloration/yellowing, which would be advantages desirable and realizable in the invention of Dhar et al. EP 0945762 combined with Ueda JP 05-323850 and Chang '478 together with (Keys et al. '152 and/or JP 06-282209) and Sommerfield et al. '998 with the yellowing clearly being undesirable as evidenced by the teachings of Sato et al. '846.

In addition to the response to the arguments presented above, the examiner notes that the references cited describe properties of 1,6-hexamethylene diisocyanate, dimers and trimers, particularly with respect to handling and discoloration/yellowing, which the examiner asserts would be of interest to one of ordinary skill in the art forming a hologram. The yellowing of the hologram would clearly decrease its transparency and render it less desirable as an optical article, particularly in holographic systems as evidenced by the teachings of Sato et al. '846. Similarly, the increased safety in handling would be of interest to those using polyisocyanate matrices.

In addition to the basis set forth above, the examiner notes that Sugiyama et al. '086 only recites 6 diisocyanates as preferable including 1,6-hexamethylene diisocyanate, dimers and trimers, which is not a long list. Further Mizuno et al. '147, similarly teaches 6 and leans towards aliphatic (including hydrogenated) diisocyanates. These lists are not so long and there is not evidence in the record relating to any unobvious benefits arising from the use of one or the other to obviate the rejection. Clearly there is motivation to use 1,6-hexamethylene diisocyanate, dimers and trimers due to these properties in the resultant urethane. The analogous nature is established by the desire to solve a common problem, in particular yellowing, which is undesirable, but occurs in some polyurethanes, and is similarly undesirable in holographic films as established by Sato et al.

5 The subject matter claimed in the instant application is very similar to that claimed in Settachayanon et al. '552 and Trentler et al. '546 and the applicant may wish to copy claims to the extent this is supported by the instant specification. If the applicant chooses to do so, the applicant is directed to call the examiner's attention to this action.

6 The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hegel et al. '019 is similar to the claimed invention, but fails to specify the diisocyanates.

7 **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after


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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Available Mondays-Thursday and alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned is 703-872-9309 .

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Martin J Angebranndt
Primary Examiner
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09/19/2005